

### NAB Group Economics

Despite inflation remaining stubbornly below the Fed's 2% goal, lower unemployment can still be expected to generate price pressures. The short-term link between wages and inflation is even less clear but, over time, strong labour costs are associated with higher inflation and also provide additional evidence that the labour market has recovered.

Many advanced economies continued to face low inflation, even in the face of continuing efforts by central banks to inflate their economies through unconventional monetary policy.

Forecasts of higher inflation in these economies rely on the view that improving labour markets will put upwards pressure on prices.

This view is endorsed by the Fed Chair, Janet Yellen who in a September 2015 speech stated "Economic theory suggests, and empirical analysis confirms, that such deviations of inflation from trend depend partly on the intensity of resource utilization in the economy—as approximated, for example, by the gap between the actual unemployment rate and its so-called natural rate...". However, another Fed member, Lael Brainard, has cautioned against relying on this past relationship.

Looking at the US we find that the relationship between the labour market and inflation is still working, although it is not that precise and other factors are also important. The short-term link from higher wages to inflation is less clear, but sustained higher wages growth – or more precisely higher unit labour costs (which adjust for productivity) - would provide added confirmation that the labour market has improved and that any pick-up in inflation would be sustained.

### Inflation and the unemployment rate

A quick look at inflation and unemployment since the 1960s does not on the face of it show a clear relationship between unemployment and inflation.

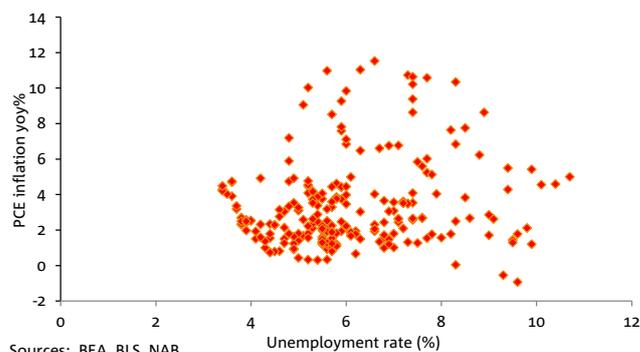
This is not surprising as inflation is ultimately a monetary phenomenon and so the relationship can change depending on the central bank's policies.

Moreover, theories of inflation stress the importance of inflation expectations in anchoring inflation, but these have gone through some pronounced changes

as the period since the 1960s includes both periods of sustained high or modest inflation.

### No obvious link between unemployment & inflation

Quarterly inflation and unemployment since 1960



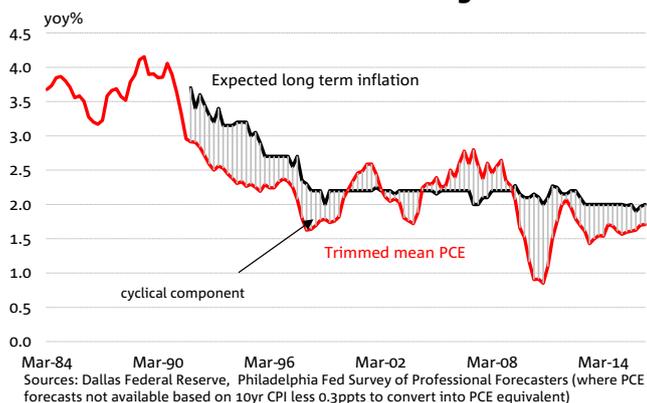
A [2012 paper](#) by the Dallas Fed set out a useful framework for linking unemployment and inflation, part of which we update below.

In this framework, inflation expectations anchor actual inflation, and the degree of spare capacity or 'slack' (measured using the unemployment rate), as well as other factors such as oil price movements can explain deviations from expected inflation.

As the chart below illustrates, when inflation expectations are steady, core inflation tends to cycle around expected inflation. Of course, core inflation has been below expected inflation for an extended period, following the GFC and the long-time it has taken to recover from it.

To get around the large, temporary, impacts on inflation of oil price movements and other one-off factors, we use the Dallas Fed's trimmed mean measure of core inflation (a similar measure is used in Australia by the Reserve Bank). While the focus in the US is often on inflation excluding energy and food, trimmed mean inflation is a better measure of underlying inflation pressures.

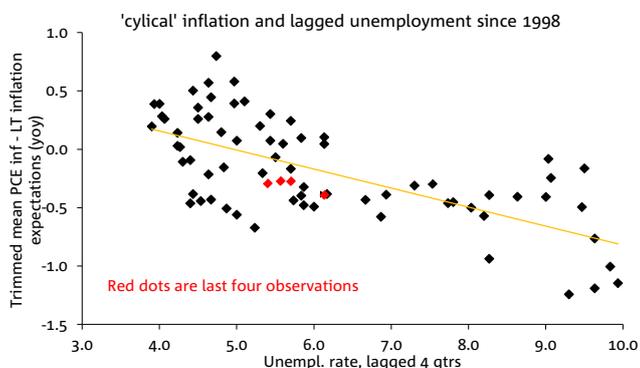
### Core inflation fluctuates around long-run trend



The difference between expected inflation and core inflation is the ‘cyclical’ component, which has a negative effect on inflation following a downturn, and a positive one when the economy is strong. To illustrate this, the chart below shows the unemployment rate four quarters ago (to reflect the lags between unemployment changes and price pressures emerging) plotted against the ‘cyclical’ inflation component.

As expected lower unemployment tends to be associated with higher ‘cyclical’ inflation component although the relationship is not that precise and there is a fair degree of variation. That said, the most recent observations are not out of line with historical experience.

### Cyclical inflation tends to increase as unemployment falls



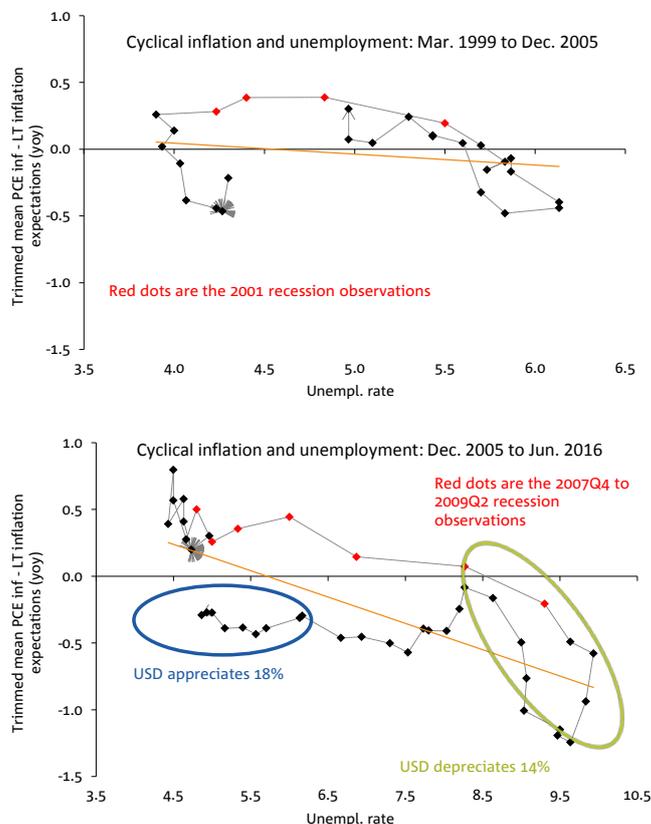
Sources: Dallas Federal Reserve, BLS, NAB. Red dots signify last four observations

It is worth looking at how unemployment and ‘cyclical’ inflation move before and after recessions. The charts below show ‘cyclical’ inflation and unemployment (not lagged) prior to and after the 2001 and 2007-09 recessions (the red dots cover the recession periods).

There is broadly the same pattern across both recessions. Prior to the recession – the peak of the businesses cycle – the cyclical component of inflation is pushing up. Even as the economy goes into recession it takes a while for cyclical inflation to start falling. The low point for cyclical inflation is after unemployment has stopped falling, but as the labour market continues to improve cyclical inflation rises.

One explanation that has been provided for this is the idea of ‘pent up’ wage cuts; typically employers are reluctant to actually reduce nominal wages, so they adjust to weak economic circumstances by keeping wages unchanged for a period of time and this delayed wage adjustment can continue even as conditions improve.

### Inflation & unemployment before & after recessions



There are some interesting differences between the two recessions. While the responsiveness of cyclical inflation to changes in unemployment overall looks lower around the early 2000s, the pick-up in inflation once unemployment started falling was faster than the current recovery period.

Movements in the US dollar are one possible explanation for this. The US dollar fell between 2002Q4 and 2005Q1 by 13%. In contrast, in the aftermath of the GFC, there have been two major moves in the currency. The first was a depreciation of over 10% occurred between early 2009 and mid-2011, which coincided with a relatively fast rate of pick up in cyclical inflation. Once this ended, and the dollar tracked sideways, inflation fell back, before resuming a gradual upwards path. This was then disrupted by the second major currency change – an appreciation of 18%, which constrained price growth. As of the June quarter, our modelling suggests that the dollar was subtracting 0.25ppt from headline inflation.

While the relationship between unemployment and inflation may be working largely as expected – once other factors are taken into account – this analysis highlights why the Fed Reserve is concerned about

slippage in inflation expectations. While the Fed has discounted financial market implied measures of inflation expectation, survey based measures have moved somewhat lower.

### Where do wages fit in

Historically, as unemployment has fallen (risen), wages growth has tended to accelerate (slow).

However, in this recovery, wages growth has been quite weak given the decline in unemployment. (There are many wage/compensation measures for the U.S. so in the charts opposite we have used a simple average of three measures for which there is a long historical data set.)

However, an unfortunate feature of the post GFC recovery has been low productivity growth. As a result unit labour cost growth (essentially wages and other compensation growth less productivity growth) is not that much different to what might be expected based on previous periods of falling unemployment.

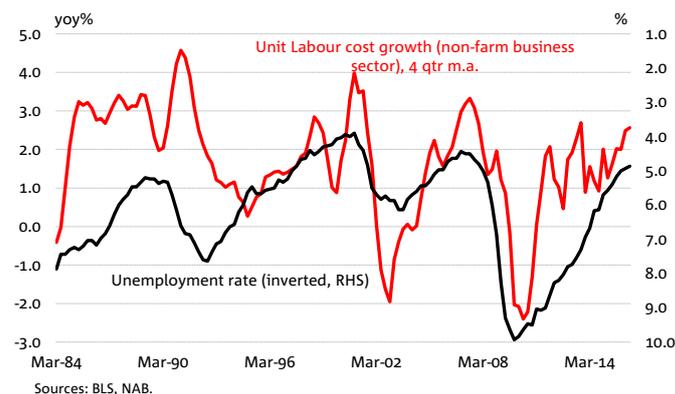
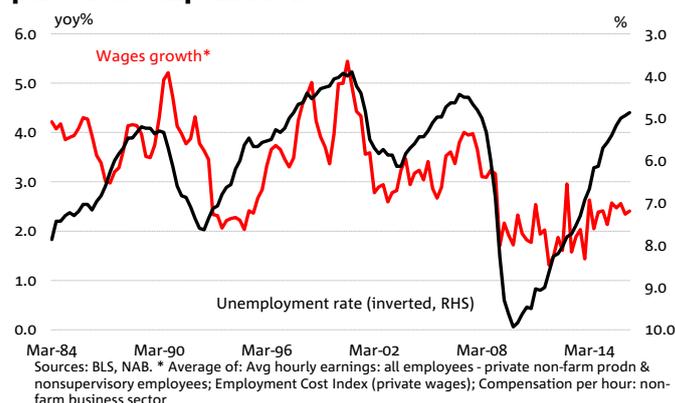
There are other factors that also may be constraining wage growth. The unemployment rate may be overstating the extent of the recovery in the labour market. Broader measures of labour market underutilisation do not show quite the same degree of recovery as the unemployment rate. Another possible explanation (and which may also explain the low observed productivity) is the retirement of high wage baby boomers who are being replaced by lower wage workers<sup>1</sup>. This possibility is supported by the strength in the Atlanta Fed's wage growth tracker as it focuses on those continuously employed and it has been showing a stronger acceleration in wages than other measures.

Wages are a major part of business costs and so it might be expected that wages will have a close relationship with prices. Of course, as noted above, how productive a worker is also relevant – paying someone twice as much doesn't add to unit costs if what they produce also doubles – so unit labour costs should be more relevant. Indeed, a higher trend for unit labour costs is associated with higher core inflation.

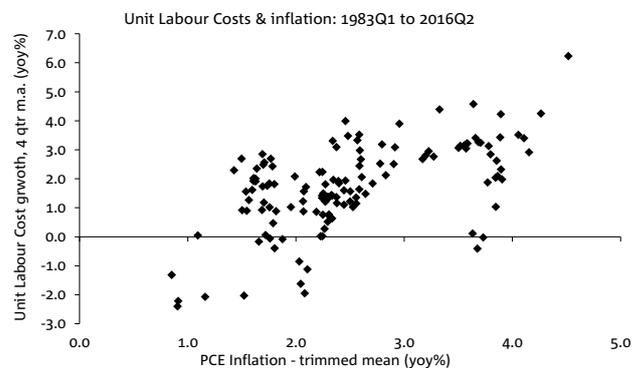
However, the relationship is not precise, particularly over short time frames. Labour costs, while important, are not the only cost faced by business. Moreover, businesses can also vary their margins (the price charged over the costs of all the inputs), which can either minimise or exaggerate the impact of changes in labour and other costs.

Perhaps not surprisingly in this light, some studies have found that changes in wage costs are not a good guide to future inflation. Indeed some research

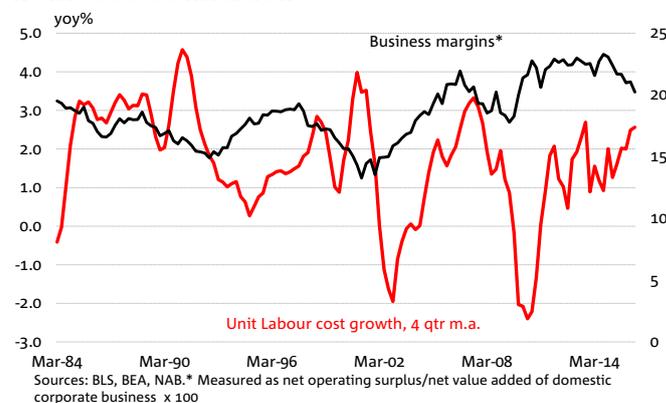
### Wages appear subdued this cycle...low productivity part of the explanation



### High inflation and high labour costs go together



### Business margins are not constant...weakening link from costs to inflation



has even found that inflation leads wages growth; one theory for this is that because wages are changed

<sup>1</sup> See Daly, M., Hobijn B., Pyle, B., What's Up with Wage Growth, FRBSF Economic Letter, 7 March 2016

infrequently, prices may be set with a view to future wage costs.<sup>2</sup>

This is not to say that the focus placed by markets and the Fed itself on wage growth is misplaced. The Fed has two goals – inflation is one and the labour market another. Stronger wages growth would provide further evidence that the labour market has healed. Secondly, while the short-term flow through of labour cost growth to future inflation may be unclear, over longer periods of time the two tend to go together. So a sustained increase in labour costs would add to the evidence that inflation has moved sustainably higher.

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<sup>2</sup> See Bidder R., Are Wages Useful in Forecasting Price Inflation, FRBSF Economic Letter, November 2015 and Peneva E., Rudd J., The Passthrough of Labor Costs to Price Inflation, Federal Reserve Finance and Economics Discussion Series, 2015-042

## U.S. ECONOMIC & FINANCIAL FORECASTS

### Year Average Chng %

	Year Average Chng %					2016				2017			
	2014	2015	2016	2017	2018	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>US GDP and Components</b>													
Household consumption	2.9	3.2	2.6	2.3	1.9	0.4	1.1	0.7	0.5	0.5	0.5	0.5	0.5
Private fixed investment	5.5	4.0	0.6	2.9	3.2	-0.2	-0.6	0.3	0.9	0.9	0.9	0.9	0.8
Government spending	-0.9	1.8	1.0	1.3	1.6	0.4	-0.4	0.3	0.3	0.4	0.4	0.4	0.4
Inventories*	-0.1	0.2	-0.4	0.1	0.0	-0.1	-0.3	0.2	0.0	0.0	0.0	0.0	0.0
Net exports*	-0.1	-0.7	-0.2	-0.2	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
<b>Real GDP</b>	<b>2.4</b>	<b>2.6</b>	<b>1.5</b>	<b>2.1</b>	<b>1.9</b>	<b>0.2</b>	<b>0.3</b>	<b>0.7</b>	<b>0.5</b>	<b>0.6</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>
<i>Note: GDP (annualised rate)</i>						0.8	1.1	2.8	2.1	2.2	2.1	2.1	2.0
<b>US Other Key Indicators (end of period)</b>													
PCE deflator-headline													
Headline	1.2	0.4	1.5	2.1	2.2	0.1	0.5	0.5	0.5	0.5	0.5	0.6	0.5
Core	1.6	1.4	1.8	2.0	2.2	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.5
Unemployment rate - qtlly average (%)	5.7	5.0	4.8	4.4	4.4	4.9	4.9	4.9	4.8	4.6	4.5	4.5	4.4
<b>US Key Interest Rates (end of period)</b>													
Fed funds rate (top of target range)	0.25	0.50	0.75	1.25	2.00	0.50	0.50	0.50	0.75	0.75	1.00	1.00	1.25
10-year bond rate	2.17	2.27	1.75	2.25	2.25	1.77	1.47	1.50	1.75	1.75	2.00	2.00	2.25

Source: NAB Group Economics

\*Contribution to real GDP

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